Guide to Dual Flight Operations:

Vaisala RS92-NGP Preparation and Performance

Data Continuity Study
Sterling Field Support Center

Attachment F

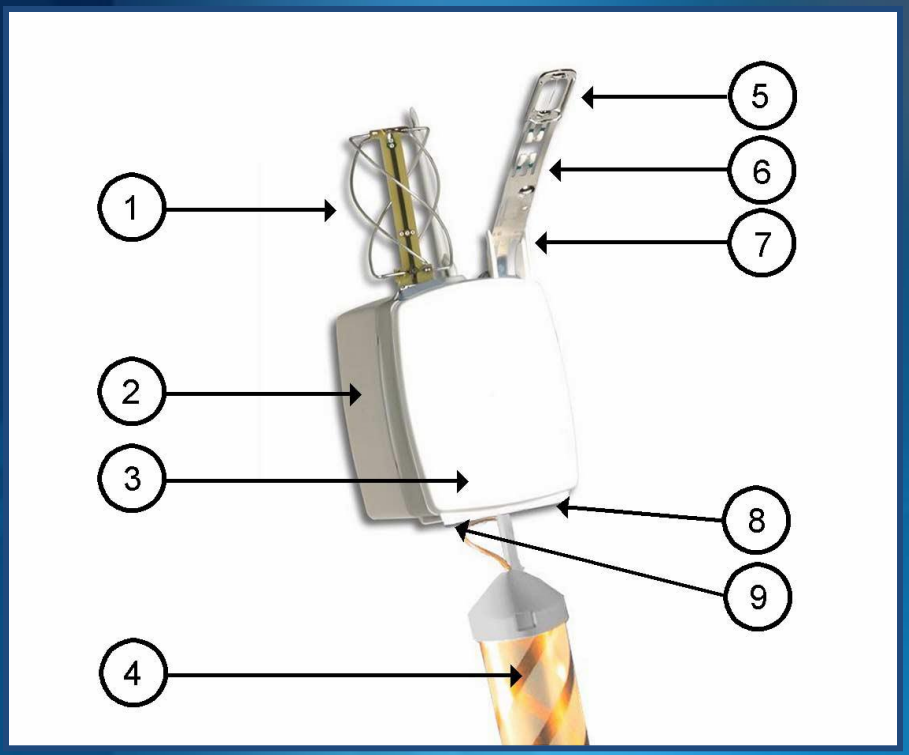
Vaisala RS92-NGP Preparation and Performance

- This familiarization is designed for observers who have taken the RRS certification test.

Covered Topics:

- RRS System Initialization
- Radiosonde Preparation and Handling
- Baselining and GPS lock
- Launching the Radiosonde
- Quality controlling after release
- Editing the Coded Messages
- Archiving
- Capture
- Controlling the TRS Antenna
- Multiple Releases
- RRS Helpline Function

Vaisala RS92-NGP

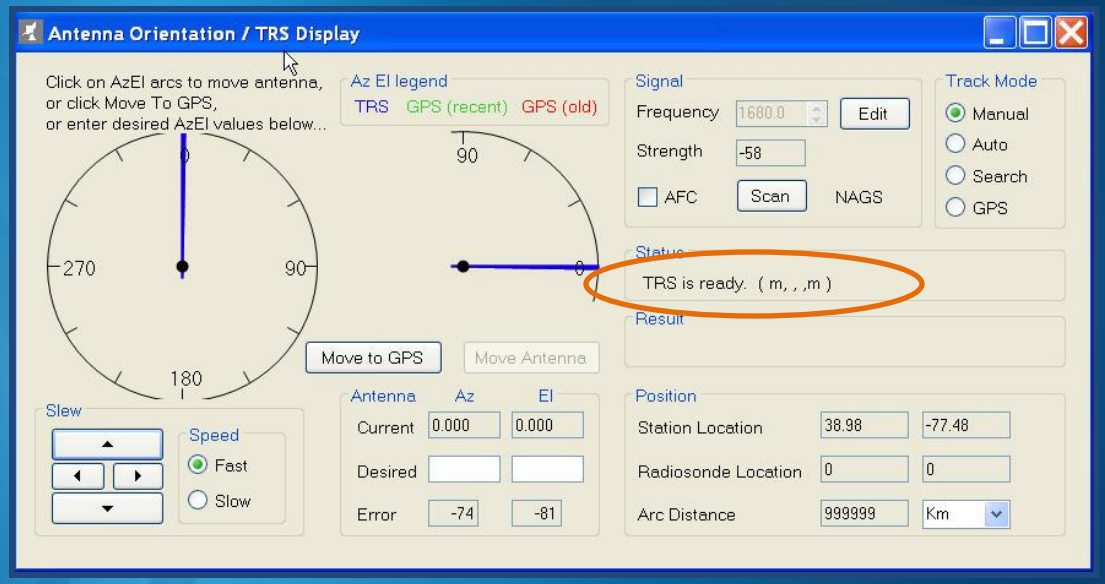


- 1 = GPS Antenna
- 2 = Battery Housing
- 3 = Vaisala Radiosonde RS92-NGP
- 4 = Antenna, mailing bag inside
- 5 = Temperature Sensor
- 6 = Humidity Sensor
- 7 = Sensor Boom
- 8 = FSD25 Interface
- 9 = Additional Sensor Interface

Total Weight of Vaisala RS92-NGP: 305 grams

RRS System Initialization

- Start RWS and allow TRS to warm-up
  - Allow at least 30 minutes prior to baseline
    - TRS Warm-up is dependent on ambient temperatures, but generally lasts between **10-30 minutes**
    - Initialization takes approximately **1 minute**
    - SPS requires **~15 minutes** to establish the GPS almanac
  - The TRS Status Line on the Antenna Orientation Display will indicate "TRS is ready" when warm-up and initialization is complete

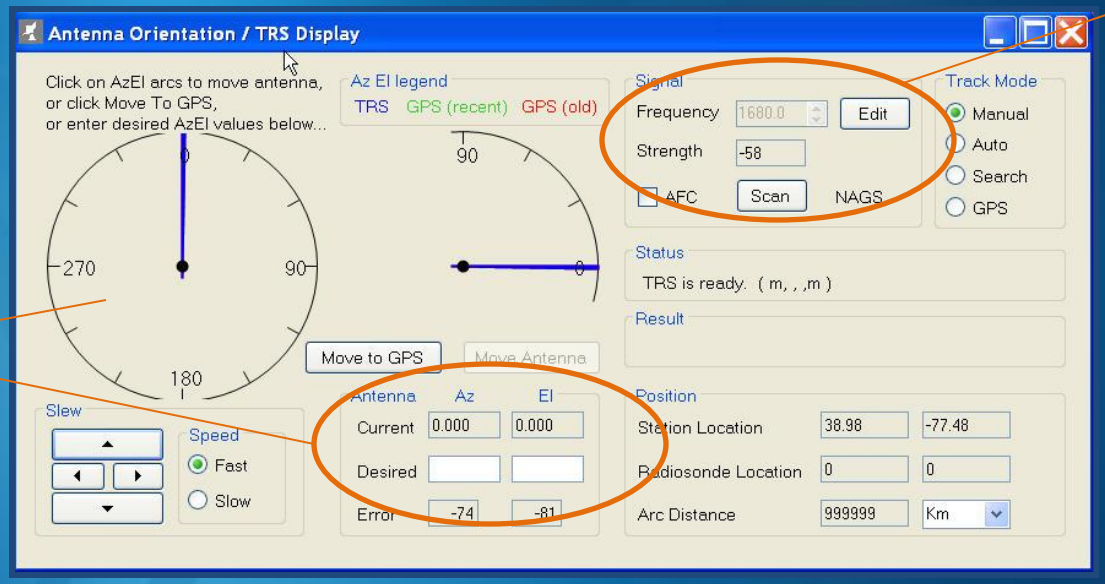


RRS System Initialization

- Prepare the TRS for baseline
  - Orientate the TRS Azimuth and Elevation towards the baseline location
  - Tune the TRS to the desired radiosonde frequency

Setting the frequency

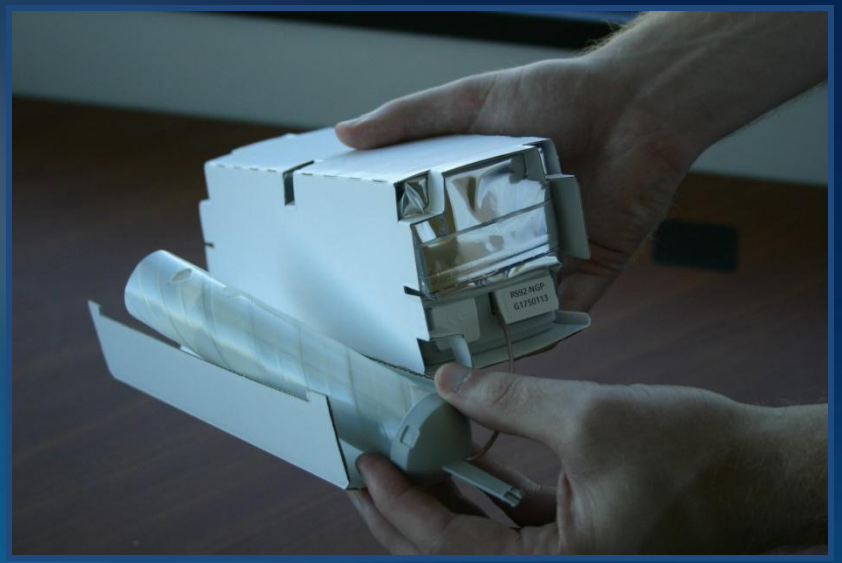
Orientating TRS Azimuth and Elevation



Radiosonde Preparation and Handling

- Carefully unpack the radiosonde and inspect for damage
- Record Serial Numbers
- Place on the Frequency Setting Device (FSD) to set the frequency and burn off contaminants
  - Plug connector into radiosonde
  - Turn on FSD power
  - Select frequency channel

CH1= 1676 MHz CH2= 1678 MHz
CH3= 1680 MHz CH4=1682 MHZ



Radiosonde Preparation and Handling

- Plug in the battery connector and attach the battery pack
  - A click will indicate the radiosonde edges are sealed
- Carefully clip the sensor boom into place
- Plug in the transmitter into the bottom of the radiosonde between the FSD25 and Additional Sensor Interfaces
- Note the lifting device

Baselining and GPS Lock

- Prior to Baselining
  - Ensure the TRS is orientated to the baseline position, tuned to the correct frequency, and that the AFC is ON
- Baseline Position
  - Radiosonde should be placed on a radiosonde stand or suspended from above
  - Do not place radiosonde on a solid surface as this may result in poor performance
  - Place under or near the GPS repeater (repeater must be powered on)
  - Observer MUST wait at least **5 minutes** before accepting baseline. Time is needed for the sensors to stabilize and for a proper sensor correction to be calculated
    - *Failure to do so will result in a required termination*
- A minimum of 4 satellite matches are required for GPS lock

Baselining and GPS Lock

Vaisala RS92-NGP on Radiosonde Stand

Vaisala RS92-NGP suspended from above

Baselining and GPS Lock

- If there is no GPS during baseline (Ref: RRS User's Guide)
  - Verify Signal Strength and Antenna Position
  - Verify that the correct amount of time has passed
  - Reset the radiosonde
    - Carefully open the plastic casing and disconnect the battery
  - Reset the SPS via the Hardware Manager Status Display
  - Reset the UPS power via the Hardware Manager Status Display
    - This may require the TRS to warm-up and complete initialization processes again

*Allow at least **15 minutes** for GPS almanac to rebuild after performing an UPS or SPS reset*

- If the pressure discrepancy is within ±3 hPa, accept baseline
  - "Waiting for Release" will then be displayed on the RWS screen

Baselining and GPS Lock

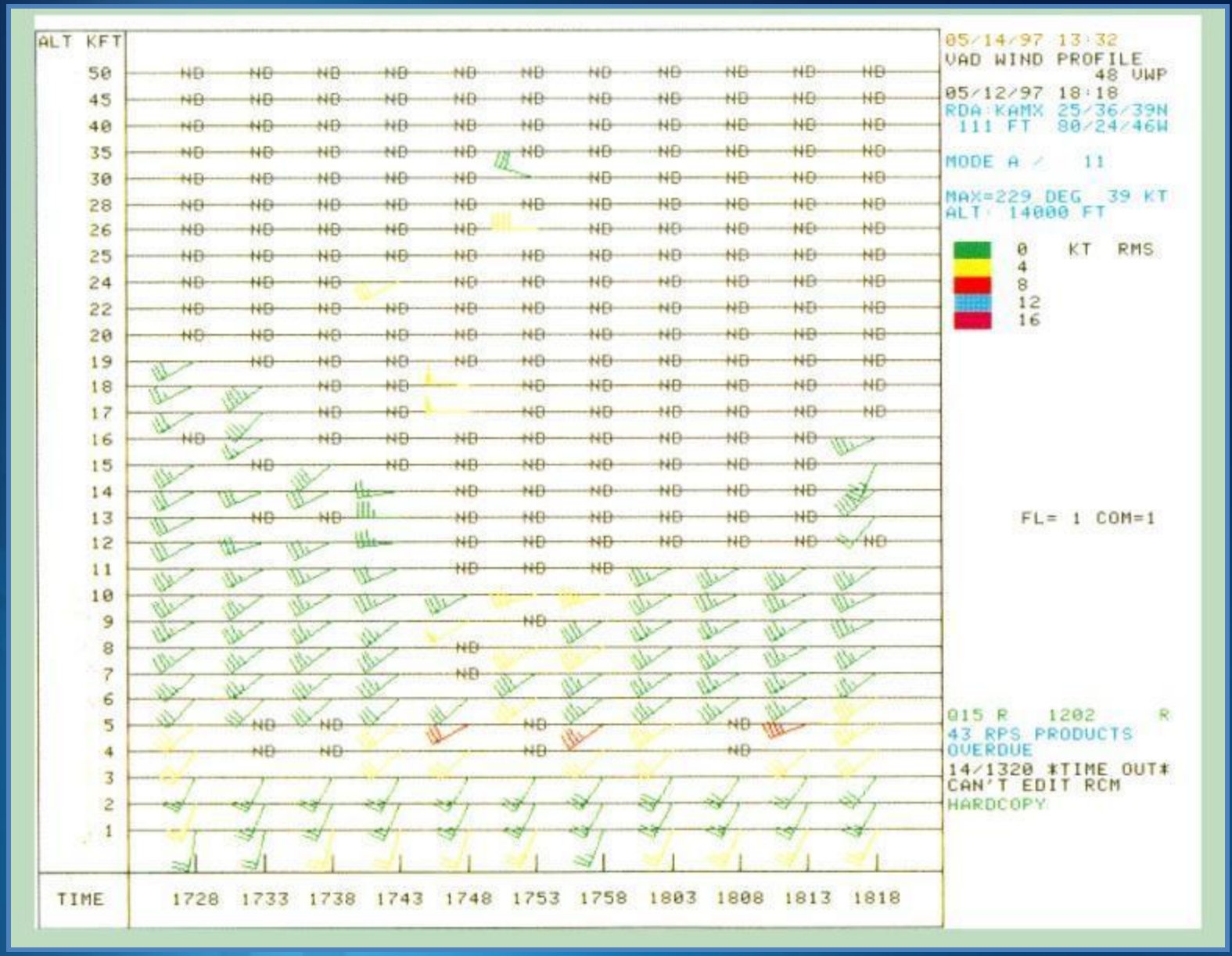
- For additional information and assistance
  - FAQs Website
    - http://ops13web.nws.noaa.gov/rrd/
  - RRS Helpline
    - (703) 661-1268

Take a Break..

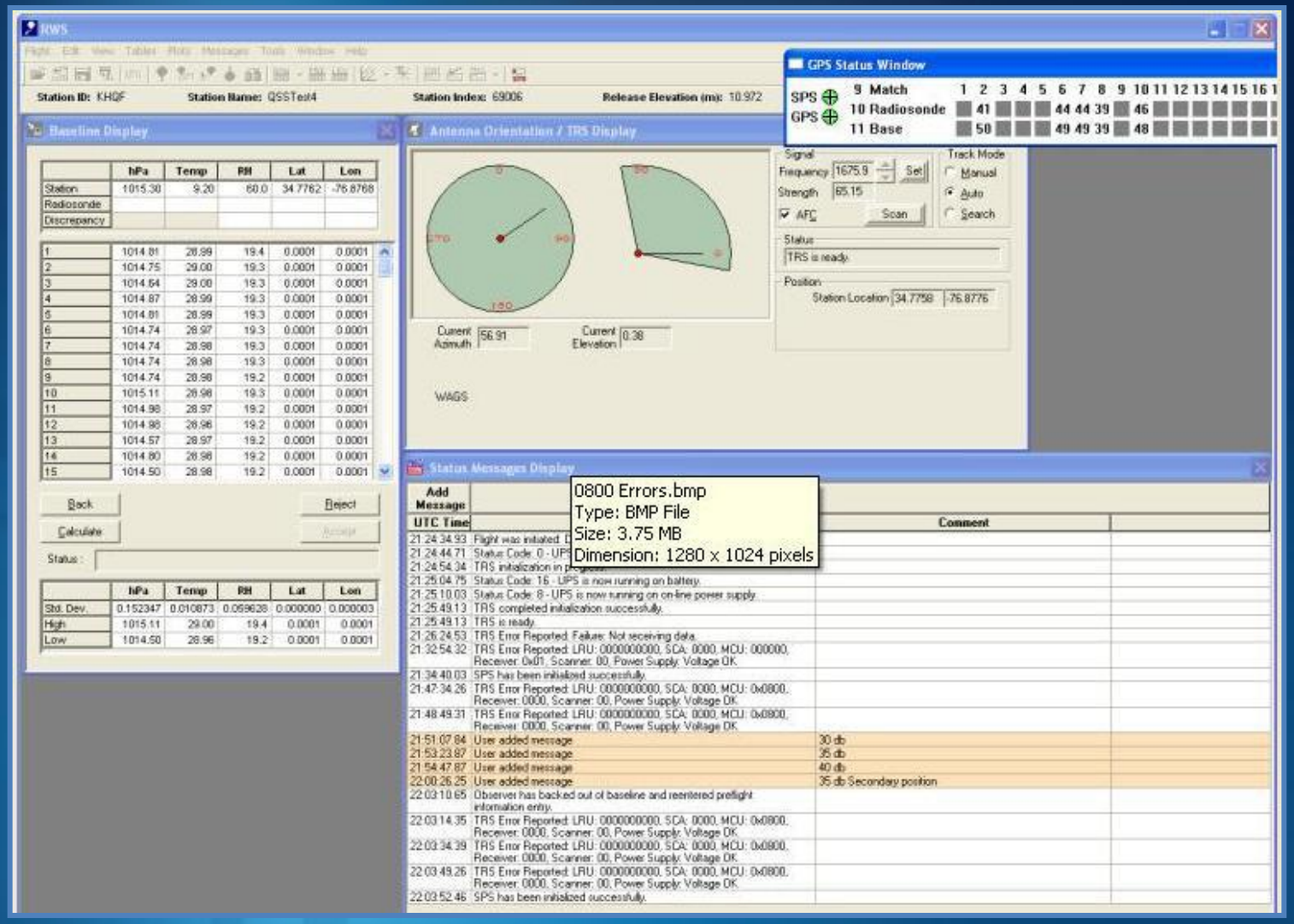
Launching the Radiosonde

- Position the TRS before proceeding to the release site
  - Manual Track Mode
  - Direct Azimuth and Elevation to where the radiosonde is expected to travel (downwind)

- After release, utilize the remote Control Display Unit (CDU) to track the radiosonde
  - **W**ide **A**ngle **G**athering **S**ystem (100 °)
  - **N**arrow **A**ngle **G**athering **S**ystem (15 °)


ALT KFT
50
45
40
35
30
28
26
25
24
22
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
ND
TIME
1728 1733 1738 1743 1748 1753 1758 1803 1808 1813 1818
05/14/97 13:32
VAD WIND PROFILE
48 VWP
05/12/97 18:18
RDA:KAMX 25/36/39N
111 FT 80/24/46W
MODE A / 11
MAX=229 DEG 39 KT
ALT 14000 FT
0 KT RMS
4
8
12
16
FL= 1 COM=1
015 R 1202 R
43 RPS PRODUCTS
OVERDUE
14/1320 *TIME OUT*
CAN'T EDIT RCM
HARDCOPY:

0x0800 Errors



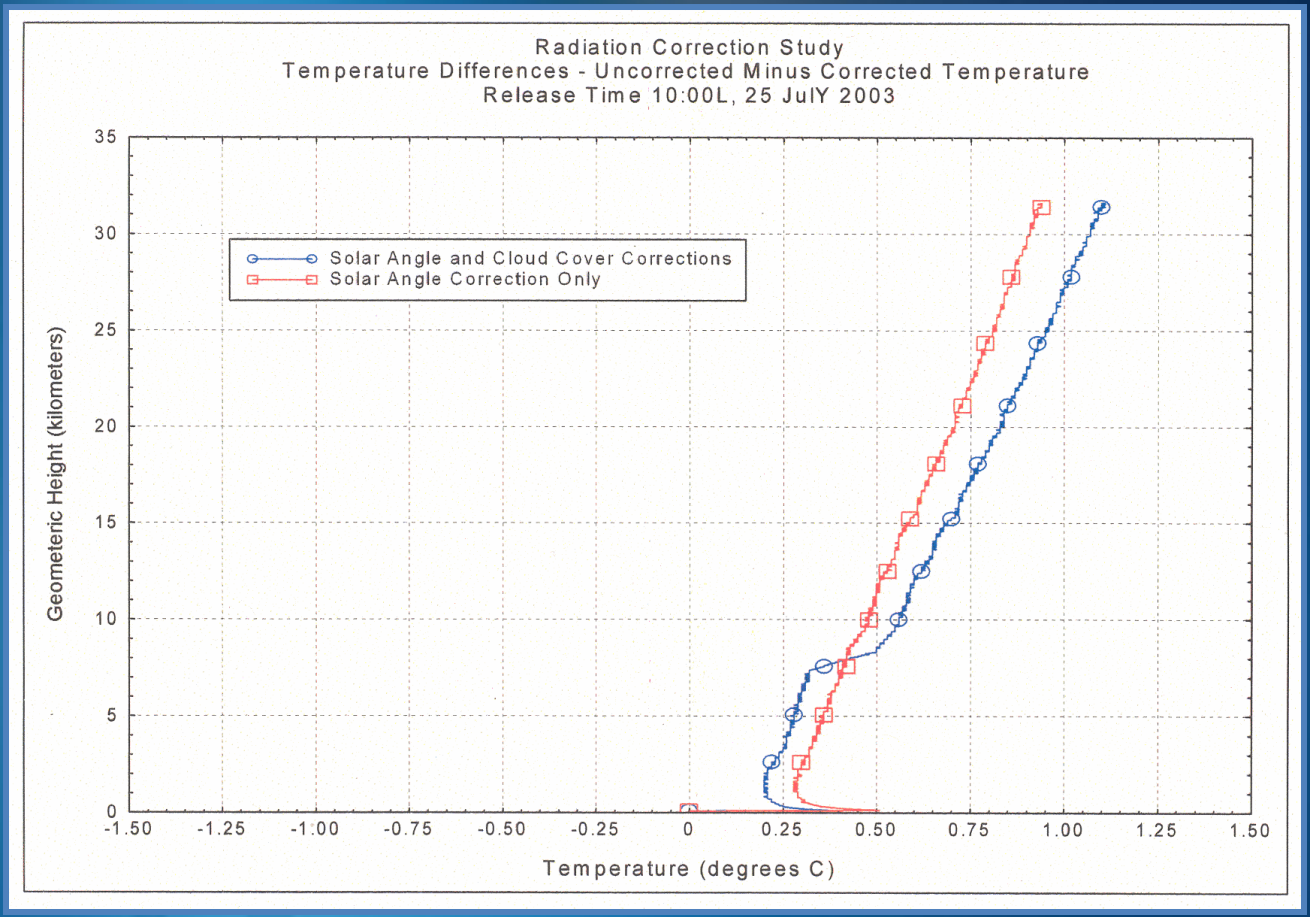
Quality Control After Release

- Ensure the TRS is tracking appropriately and that signal strength is acceptable
  - Place the Antenna into the Move to GPS mode only if GPS is available
    - Selecting Move to GPS when GPS is not available may cause the software to freeze
  - Monitor the Status Messages for any tracking notifications

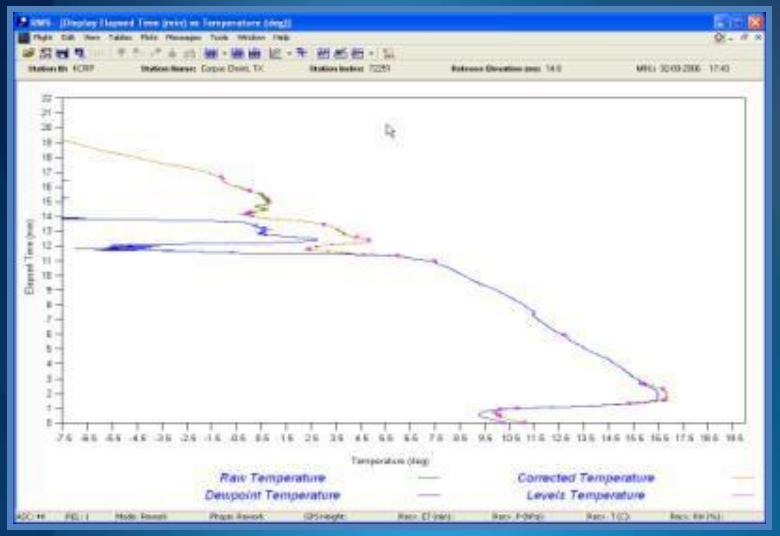
- Update the Surface Observation and release time as necessary
  - For release time, check the first pressure data point below the red line in the Received PTU Tabular Display
    - Should have a pressure less than or equal to the release pressure shown in the Surface Observation
  - Check the Geopotential Height and ensure it increases with time
  - Verify the Cloud/Weather observation and ensure it's accurate at release

Temperature Correction

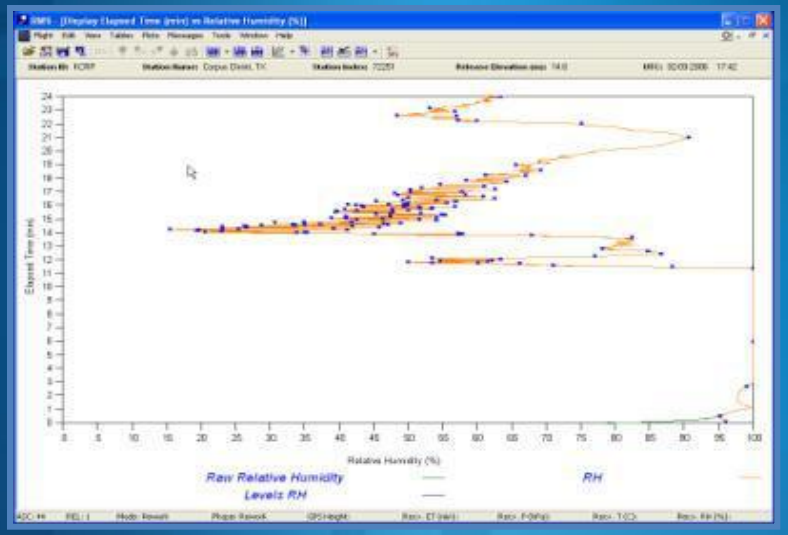
- Temperature correction added to raw temperature
  - Red is the correction for the solar angle with no clouds
  - Blue is the correction for the solar angle with a cloud deck at 8 km



Quality Control After Release



Wet-bulb Effect



Noisy RH Data

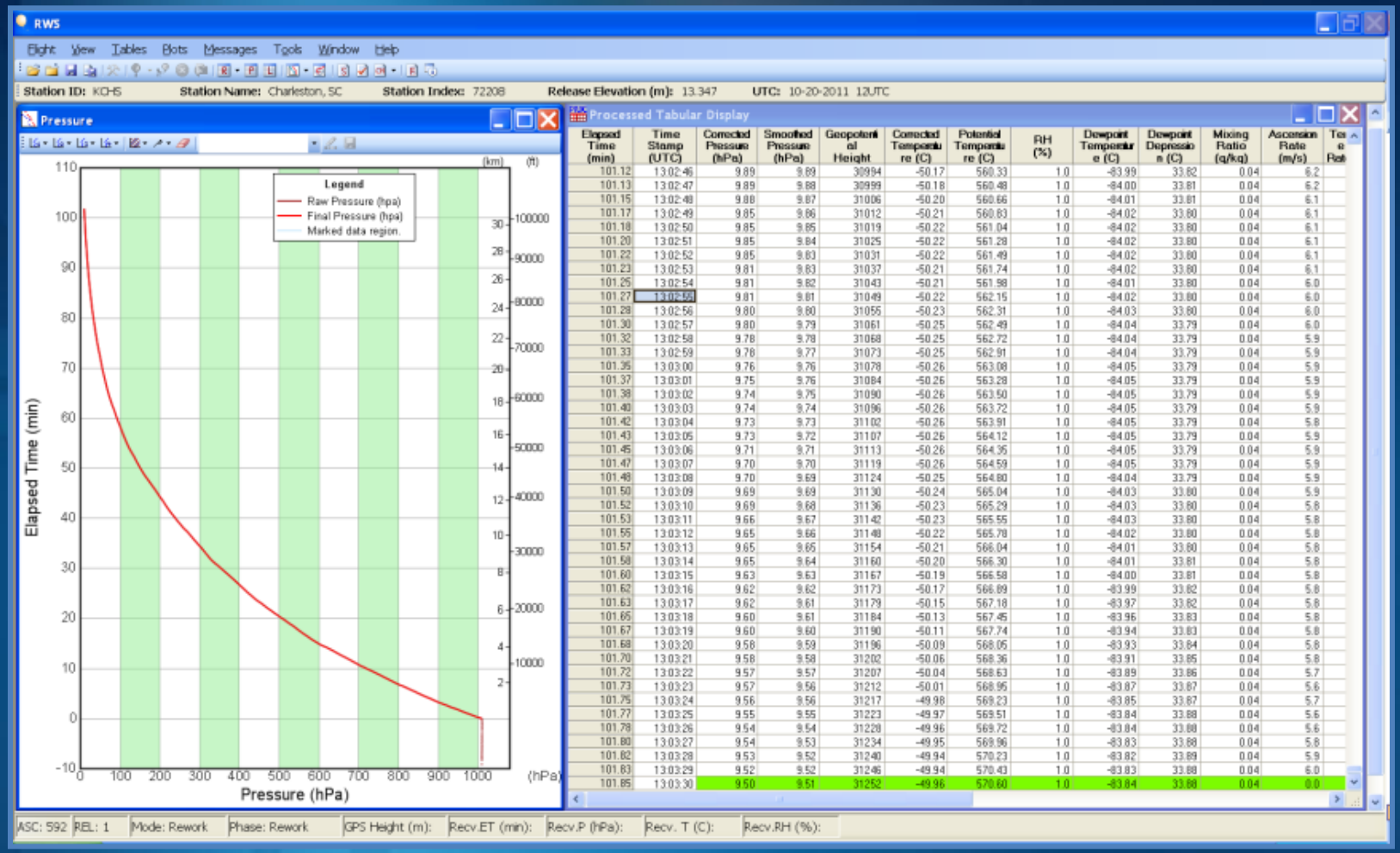
- Marking & Editing Data
  - Verify data continuity from the surface into flight
    - Dry RH bias just off the surface
  - Common data quality problems requiring attention
    - "Wet-bulb effect"
    - Noisy RH data
    - Super-adiabatic lapse rates
  - During flight, periodically check for anomalous data
    - Plots
    - Check Messages

Editing Coded Messages

- Once the Coded Messages are generated, review plots, Check Messages and Tabular data prior to transmission
  - If changes to the flight data are made, Coded Messages will need to be recoded
    - Edits made in the Processed Tabular Display
- Do not edit the body of the Coded Messages unless absolutely necessary
  - Necessary edits include:
    - Adding appropriate 101 groups
    - Adding appropriate Icing comments to RADAT
  - Editing the message body will not affect the processed data
  - Edits to the message body are not saved to the NCDC Archive file

Quality Control After Release

- When the flight has terminated, verify termination time and reason



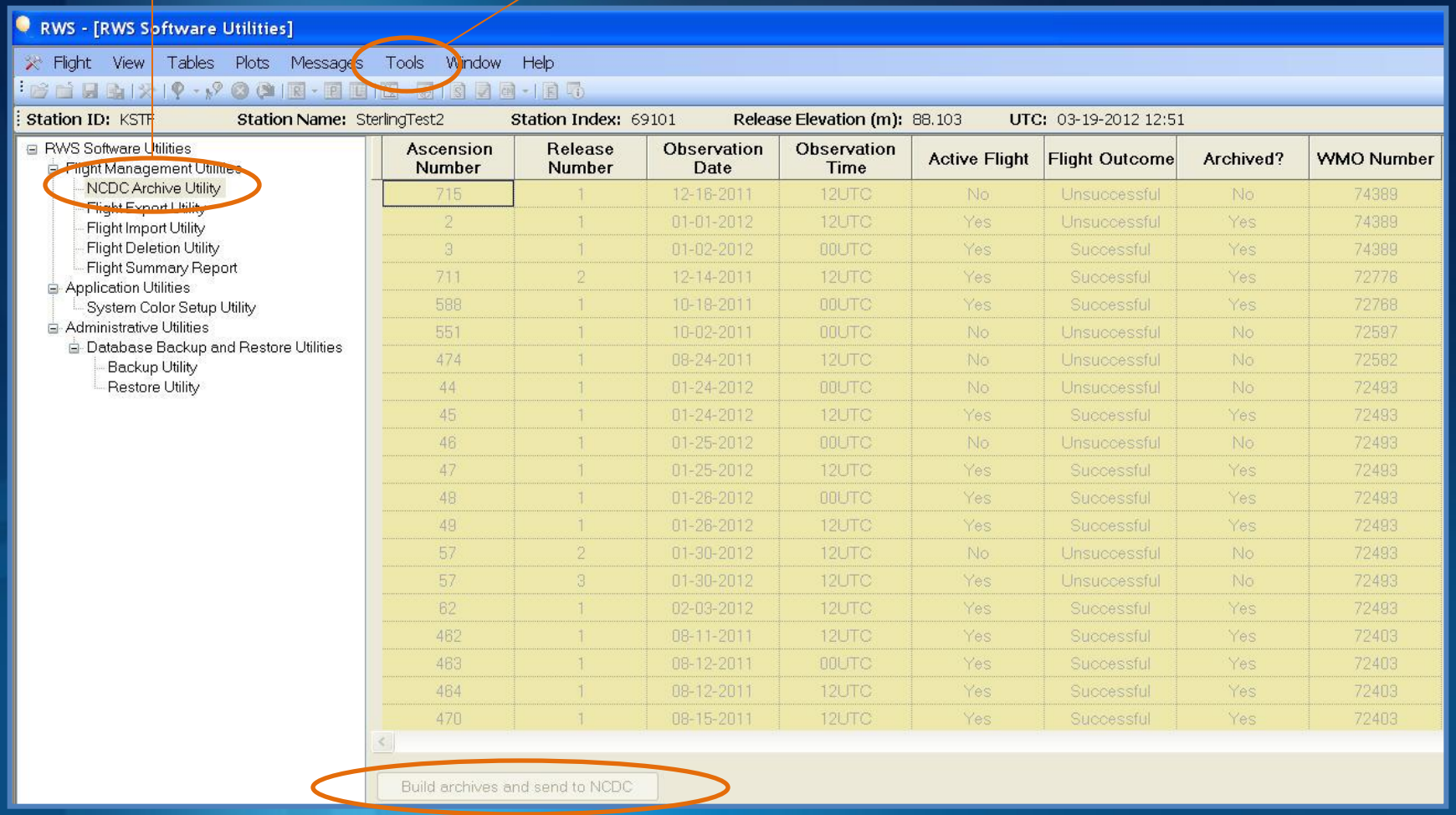
Take a Break..

Transmitting an Archived Flight

- In Utilities, select NCDC Archive Utilities
  - Select the flight to Archive
  - Select "Build Archives and send to NCDC"
  - Individual log files for each office can be found here:
    - www1.ncdc.noaa.gov/pub/data/ua/RRS/2008/

2. NCDC Archive Utility

1. Tools -> Utilities



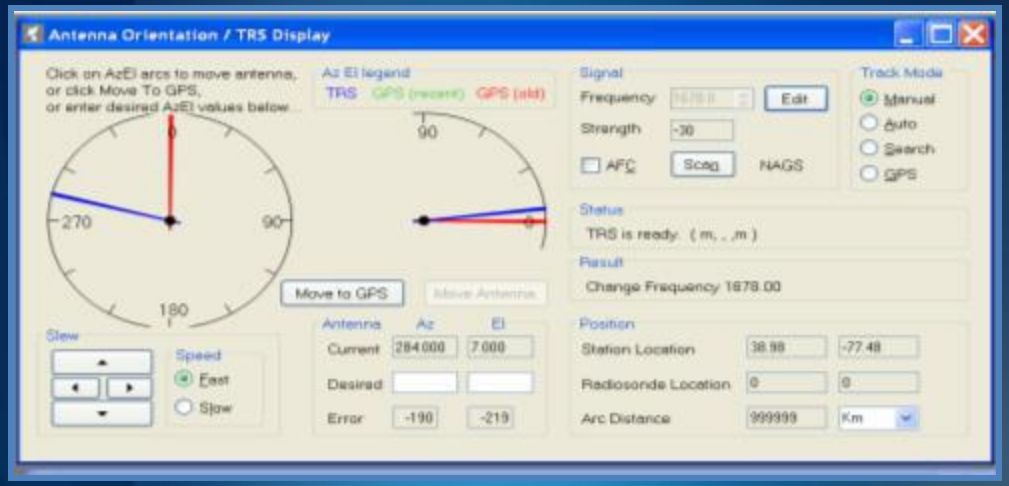
3. Build Archives and send to NCDC

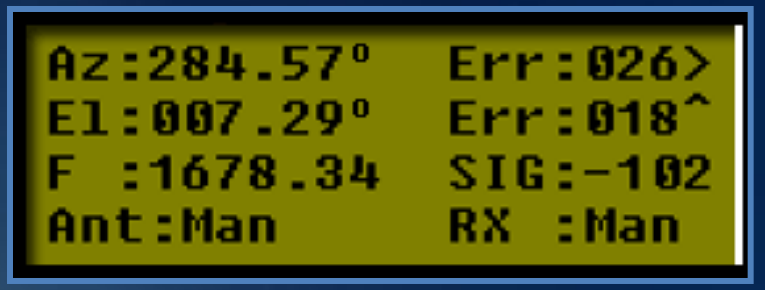
RWS Capture Program

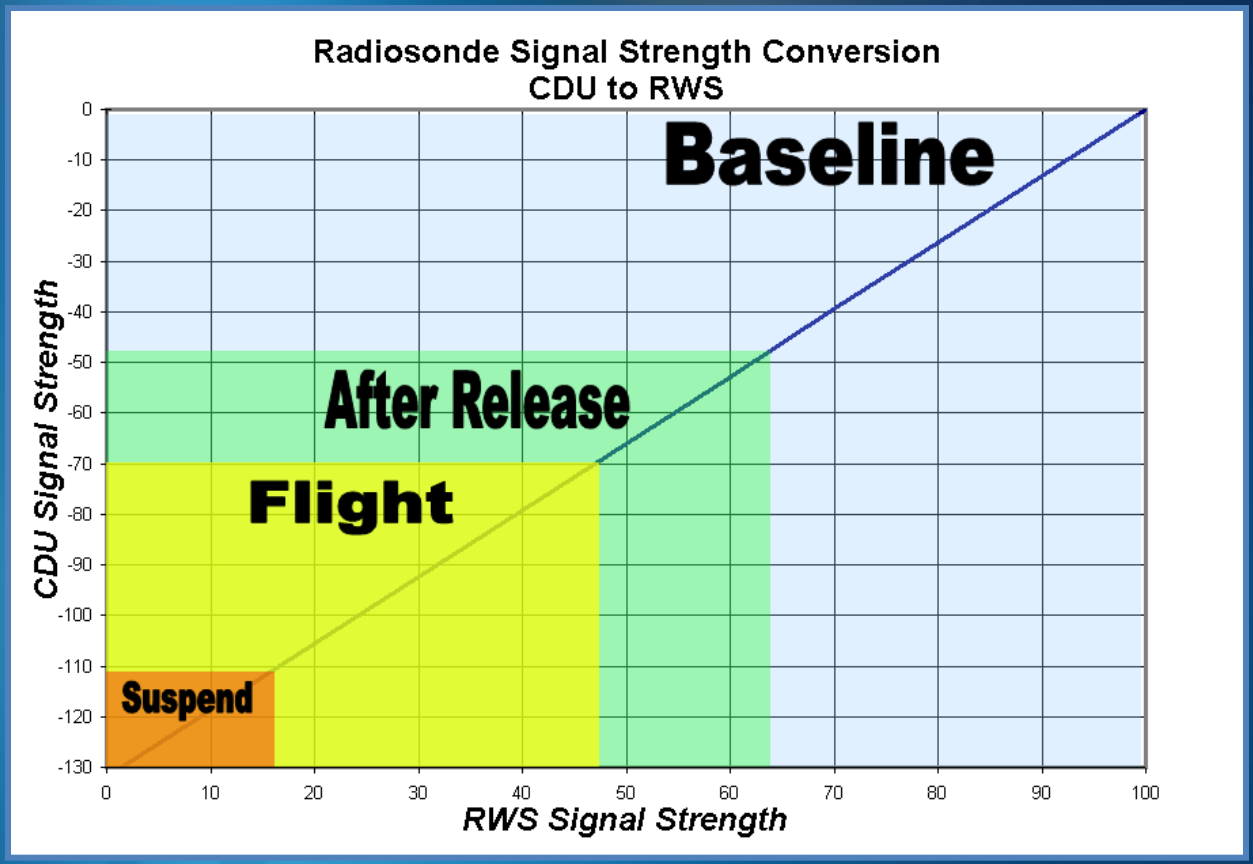
- Captures the flight data and associated logs
  - Sends flight data and logs to WSH
    - Software and RRS performance analysis
  - First 30 days
    - Run Capture after each flight
  - After the first 30 days
    - Run Capture for flights that have problems or pose concerns
- Select icon located on the desktop
  - Select the most recent release & ascension number from a pull down menu
  - Click Capture
  - Flight data and logs are then sent to WSH

Controlling the TRS Antenna

Remote Control Display Unit (RCDU)


Antenna Orientation / TRS Display
Click on Az/El arcs to move antenna,
or click Move To GPS,
or enter desired Az/El values below
Az El legend
TRS
GPS (recent)
GPS (old)
Signal
Frequency
Edit
Strength
AFC
Scan
NAGS
Track Mode
Manual
Auto
Search
GPS
Status
TRS is ready (m, , m)
Result
Change Frequency 1678.00
Move to GPS
Move Antenna
Slew
Speed
Fast
Slow
Antenna
Az
El
Current
284.000
7.000
Desired
Error
-190
-219
Position
Station Location
38.98
-77.48
Radiosonde Location
Arc Distance
999999
Km


Az:284.57°
Err:026>
El:007.29°
Err:018^
F :1678.34
SIG:-102
Ant:Man
RX :Man


Radiosonde Signal Strength Conversion
CDU to RWS
Baseline
After Release
Flight
Suspend
CDU Signal Strength
RWS Signal Strength
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
0
10
20
30
40
50
60
70
80
90
100

Second and Third Releases

- Leave UPS(TRS) ON after the first release
- Place the TRS in Manual
- Set the new radiosonde to a different frequency
- Set the TRS to the new frequency
  - Don't Scan as this could cause the TRS to lock onto the previous radiosonde
- Move TRS back to the baseline position
- After a successful flight, select the active release to Archive

NWS Sterling Field Support Center
RRS Helpline

- The RRS Helpline does not supersede your local or regional policies, procedures or regulations.
- Problems identified to be outside of the scope of the RRS Helpline will be escalated to the appropriate personnel.
- Issues affecting successful launches take priority.

Hours of Operation

M-F

10:00-02:00 UTC

No Holidays

Contact

(703) 661-1268

(703) 661-1293